THE STATE TEACHERS COLLEGE OF COLORADO

THE NECESSITY FOR AGRICULTURAL EDUCATION
IN ALL OUR HIGH SCHOOLS

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THE NECESSITY FOR AGRICULTURAL EDUCATION IN ALL OUR HIGH SCHOOLS.

Considerable agricultural education has been given in the United States in the past by agricultural colleges and by departments of a few Universities, and by the U. S. Department of Agriculture in the form of bulletins, circulars and year-books. These latter have been widely distributed, but wherever found they are usually so thickly covered with dust that one must conclude that their valuable contents are seldom or never perused. The colleges and universities have of course reached only a very, very few of those in need of agricultural education.

Almost a hundred years ago a few agricultural schools of secondary rank were started here and there in eastern states, but they did not flourish much nor survive long because they lacked adequate support, being mostly under private auspices; also because the general feeling was that education beyond the "three R's" was needed only as a preparation for the church, law or medicine, and because unlimited virgin land in the West, almost without money-cost, attracted nearly all agriculturally-inclined people away from the rocky hills of the New England States and the worn-out tobacco lands of Virginia. The rich new lands responded almost as well for the ignorant as for the educated farmers, aided in their efforts as all sorts alike were by the marvelously efficient American farm machinery.

Only a decade ago, high schools offering courses in agriculture were rare and far between, but recent development in this direction has been remarkably rapid. In the course of this development, several different kinds of schools have been concerned:
1. The "schools of agriculture" (agricultural high schools) established in connection with State Agricultural Colleges, Minnesota being the pioneer in 1888, and Nebraska and many other States soon following. In 1909 such a department or school was opened in connection with the Colorado State Agricultural College, and now (1914) has over 400 students, in addition to more than 500 in the College proper.

2. Special agricultural high schools of various types, without connection with higher institutions;
   a. Congressional district agricultural high schools, first established in Alabama in 1896, and later in Georgia;
   b. County agricultural high schools, the first being established in Wisconsin in 1902. Similar to the foregoing are those of judicial districts, # in Oklahoma, and of other large districts, as the San Luis Obispo School in California, opened Oct. 1, 1903.

3. Ordinary public high schools
   a. With some aid from the State, as in eleven States, Virginia beginning this manner of encouraging agricultural instruction in 1908, Maine and Minnesota in 1909, Louisiana, Maryland and New York in 1910, Kansas, Massachusetts, North-Dakota, Texas and Wisconsin in 1911; Arizona and Rhode Island in 1912;
   b. Without any State or Federal aid,—the ordinary local high school, depending for support, at least as far as any particular studies are concerned, upon the immediate community only. It seems impossible to tell just when definite agricultural instruction began in the ordinary unaided high school,
but it coincided pretty closely with the beginning of the twentieth century.

The most rapid development of secondary agricultural instruction has occurred during the past few years. Eight years ago (1908) agriculture was taught in only about seventy-five public high schools in the whole country. Now such instruction is given in more than three hundred high schools in the State of Ohio alone, over 200 in Nebraska and Missouri each, over 150 in Kansas and Minnesota each and in considerably over 2,000 in the entire country. Some of these receive federal or state aid, but most of them give the courses in agriculture without any special outside aid.

This wonderfully rapid growth of agricultural education in secondary schools shows that the thinking people of the country as a whole have come to realize the immense and immediate importance of improving our agriculture through education. Universities, Agricultural Colleges and Normal Schools on the one hand, and elementary schools on the other, are also pushing ahead in the same direction, but the present discussion refers only to the ordinary local public high schools.

What is the reason for this sudden and wide-spread interest in agricultural education? The principal reason is that conditions have become very different from those of only twenty years ago. Practically no more "virgin soil" is to be had now, the areas still to be brought into use by reclamation projects through irrigation or drainage being comparatively limited in extent. Parts of states once "out west" and formerly very rich and productive have already become so poor in soil as to be almost worthless for agricultural pur-
poses, as, for instance, a large area in southern Illinois. This run-down condition is not the result of farming, but of ignorant farming, — farming without foresight; without regard to scientific principles; in short, farming without education.

Unless better methods are speedily introduced, and learned and practised by millions of farmers and farmers-to-be, the rest of the country will soon be in the same condition as southern Illinois, with worse to follow. Almost all plants, soils and animals in this woefully wasted land of ours, — the scraggly window-sill geranium in its undrained tomato can, the weedy back-yard garden, the unhealthy front-yard grass, trees, shrubbery and vines, no less than the unproductive, impoverished farms and the multifarious hybrids of cattle, horse, sheep, hog and poultry varieties to be seen upon them, show the need of systematic, practical, scientific, thorough agricultural education.

The situation has lately become critical. Already there is a general outcry concerning the high prices of foods. The future begins to look alarming. We, the people now living, must develop a better agriculture than the world has ever known, or our grandchildren will suffer from hunger. There will be millions more of people here in the near future, but no more land. If our population continues to double every twenty-five years, as it has in the past, in fifty years more we shall have four hundred millions, — the population of China! And in fifty years the known supply of phosphorus in the "corn-belt" will be entirely exhausted, and plant growth will cease, unless great and radical changes in our agricultu-
ural methods occur very soon. In the first place, the exportation of phosphate-rock should be absolutely prohibited. The best brains of the country should be trained for the study of agricultural problems. Every farmer should conserve the fertility of his land to the utmost, and bring every foot up to the best condition for the production of crops and keep the land in that condition and then all should see to it that good prices are obtained for the results of the farmers' labor, skill, intelligence and expert knowledge. This does not mean necessarily, that prices should be higher, but that together with an increased production, a larger proportion of the prices obtained should go to the farmer and a smaller proportion to transportation companies and "middle-men." All these things may be accomplished by education, and by education only. The efficacy of such education has already been strikingly demonstrated. With only a little instruction in agriculture, mere boys have improved the soil and have raised two or three times more corn and cotton per acre than their fathers ever did.

The place for the bulk of this education is obviously the high school, since so few, relatively, continue beyond this stage of our educational system while on the other hand, the children of the grades are unable to grasp the scientific and business principles of the subject.

The question naturally arises, in which high schools should agriculture be taught? Surely not in all of them, as Latin is taught, for instance? Yes! Agriculture should be taught in every high school, no matter where it is located or what its surroundings are. If it is so with Latin, which was originally taught as a basis for the ministry (a strictly utili-
itarian and vocational object, by the way,) and later, partly for a very doubtful disciplinary and cultural value, partly through mere conservatism and tradition, and partly for its real value in the matter of word interpretation, and literary appreciation if carried far enough, why not so with agriculture, which is the basis for farming, the biggest and best occupation of mankind, the broadest in knowledge-requirement and the deepest in cultural values, the richest in beauties and mysteries, the foundation of prosperity, practised by nearly half of our entire population and absolutely depended upon by the other half for their very existence?

As to culture, Latin has very little culture-value in its early stages, and very few of the many who are forced to study it ever go beyond the minimum requirement, mostly limited to the dry bones of grammar and painful word-by-word translation. On the contrary, the very first year of agricultural study is exceedingly rich in pure culture as well as in material directly applicable to the problems of real life. I cannot help but believe that there is more culture in studying, apprehending, and appreciating the wonderful and beautiful facts and phenomena connected with variation and heredity, nutrition and reproduction, osmosis and capillarity, etc., etc., than in the parrot-like repetition of "hic, haec, hoc; huius, huius, huius; hic, hic, hic; hunc, hunc, hoc; hunc, hunc, hoc, hoc." I am not seeing "one side of the shield" only, either, for I read Cicero under Prof. Wiener, now of Harvard. Nor am I alone in this view. C. Stanley Hall says, "The nature and needs of the adolescent mind demand bread and meat, while Latin rudiments are mere husks." 1 E. C. Bishop, of Nebraska (State Sup't of

Public Instruction,) says, "Agriculture bids fair to become soon our most popular science in elementary and secondary schools. Its value as a practical subject, appealing to the every-day business and social life, is exceeded only by its value as a disciplinary study and as an ethical training second to no other." G. F. Warren, of Cornell, said at a recent meeting of the National Educational Association, "One or more years of agriculture can be taught in a high school just as algebra is now taught. It will naturally replace foreign language. I know that this sentence will arouse the fury of our live teachers of the dead languages, but I beg them to remember that this does not mean fewer students in language, but means that many bright boys who refuse to take the present course will be held in school."

This matter is exceedingly well set forth by William Hawley Smith, in his famous book, "All the Children of All the People." While not directly mentioning agriculture, the system that he refers to in the following quotation is very free election of all kinds of studies, an effort being made to offer subjects suitable to all kinds and conditions of people. He says, "This system has been pursued by the Galesburg, Ill., high school for some years, and with the most remarkable success. Before adopting this plan, its graduates rarely exceeded forty per year. At the end of six years' use of the System, it graduated a class of 124 for that year; and it promises to exceed that number each coming year, as time goes on. During this time the attendance at the high school has increased 240%.

while the schools of the city as a whole have grown only 40\% and the population of the city only 20\%. Each year more "Classical" diplomas (College entrance diplomas) have been issued than ever before; and, in addition, twice as many "elective" diplomas have been issued to pupils who would have dropped out of school, or never entered the high school at all, had it not been for the adaptation of the course of study to their individual needs."

Agriculture is one of the studies which applies to the above conditions, and through it many boys will be held in high school, and be raised, through education, including the other courses that they will take, to a higher plane of living, and accomplishment and social service than they would otherwise have ever attained to.

The teaching of agriculture is right in line with the present tendency to connect education more closely with real life. As E. E. Balcomb, formerly of Oklahoma State Agricultural College, puts it, "For years we have educated pupils and parents to feel that education, the real article, meant so much knowledge of abstractions, of algebraic terms, and the ability to decipher Greek and Latin, -- a mass of knowledge which has no application to the life they are to lead. Now we must go through the process of educating the mass of the people to our new conception of education."

Instruction in the principles of agriculture, when rightly given, accomplishes better than work in any other subject the much-desired connection with "real life." Rare indeed is

1 Wm. Hawley Smith, "All the Children of All the People." p. 202.
the person who does not have something to do at sometime or other with plant or animal life. - If not by direct contact, the prices of beef and pork, butter and eggs, give a decidedly strong interest in agricultural matters, even though indirect.

Another consideration naturally comes up right here, and that is the fact that agriculture has been a fundamental and extensive part of the process of racial development in the social and economic aspects. - Undoubtedly the recapitulation idea has been overworked by some educators, but when we remember how many boys and girls have been enabled to "find themselves" through the agency of the manual training and domestic science studies so recently introduced, we are compelled to believe that there is something in the recapitulation idea, after all, when not applied too rigidly and dogmatically. The imprint of the racial experience in agriculture is so strong upon us even yet, including members of families who have lived for generations in cities, that he is scarcely normal who does not feel an almost uncontrollable impulse in the spring-time to stir the soil and plant seeds. Agricultural instruction would be justifiable if for no other purpose than filling in this "aching void" which has hither-to been left to yawn, empty and unsatisfied, almost universally, in the American educational process. The omission of agricultural instruction is therefore poor pedagogy, being contrary to the principles of genetic philosophy.

Furthermore, the study of agriculture is a most excellent introduction to all the sciences, on the basis of "recapitulation" as well as in subject-matter. The study of the soil is a direct introduction to the science of geology; of the soil and plant-foods, to chemistry; of the movements of soil-water
and its passage into the root-hairs, effects of temperature, etc., to physics; of the plants themselves, to botany; of the animals, including birds, insects and other lower forms of animal - life connected with agriculture, to zoology; of the functions of plant and animal organs, to physiology; of the reproductive functions, especially, to "sexology" and eugenics. Practically all the sciences have active contact with agriculture.

So it is that in many places, perhaps in the State of California particularly, agriculture is the regular first-year science-study, serving as an excellent introduction to all the specialized sciences. Thus a never-ending interest in higher education is aroused in many who would otherwise have been "slaughtered" educationally by those famous and efficient instruments (medieval shall we say?) of ephetic torture, Latin and algebra.

It should be noted in this connection, however, that there is great difference of opinion as to the time for presenting agriculture in the high school. Prof. Shull, of the University of Kansas, takes the view that instruction in agriculture should be preceded by five full units of work in physics, chemistry, and the biological sciences, and insists that agriculture taken in the first or second high school year is little more than useless so far as practical value is concerned. It is evident that much depends upon which is the prime object of the instruction in agriculture: Whether to serve as a pedagogical device for keeping boys in school and arousing in them an interest in the special sciences, or to really prepare boys to be agriculturists. In the former case agriculture should be at the beginning of the four-year high school course, in the latter, at the end. If only one or two years' work in agriculture can be given,
a positive decision between the above two objects or "aims" must be made. A well-planned four-years' course in agriculture fulfills both objects.

At least one or two years of agricultural instruction in all our high schools would be a powerful force against the prevalent drift of young men from country to city, and would undoubtedly before very long actually set up a current in the opposite direction. Too many boys and girls think that city-life is the only life worth while. The reason for this is that so much of the farming in the United States has been carried on under pioneering conditions that most people believe that farming has to be that way. But that stage of our development is almost over now. Telephones, rural mail-delivery and automobiles have eliminated the lonesomeness of country-life, improved machinery has lessened the hard hand-work (a dairy man told me recently that his cows preferred the machine-milking to hand-milking; and a recent report from the South Dakota Experiment Station shows more milk and butter fat by machine than by hand milking in a six months test), and it only remains for agricultural education to increase the interest and understanding, and to improve the methods, not only of production, but of marketing, and also of living, to put life on the farm on a par with, if not on a higher plane than, any other mode of life in the world. As far as the mere comforts of life are concerned, Prof. Davenport has shown that for an expense merely equal to the cost of a moderately desirable city residence lot a farm-house may be supplied with all the city conveniences in the way of light, heat, water and power. Kitchen, bath-room, laundry-room and all, even the stable, may be made comfortable and convenient
by the installation of modern mechanical devices at an ex-
pense of less than two thousand dollars. Lawns, trees, 
vines and shrubbery complete a home such as the pioneers of 
only a generation ago never dreamed of, yet it is all possi-
ble and practicable on every farm today. How shall the child-
ren of the present come to know this? Not through their par-
ents, for they know only the reverse side of the picture, and 
warn their boys and girls against the hardships of life in 
the country. Only through agricultural education in our 
schools can this matter, which has now become of paramount 
importance, be set aright.

It is not to be inferred from the foregoing that all 
farmers are ignorant and all farms run down. There is a mark-
ed disposition on the part of city people to regard farmers as 
an ignorant class of people. The fact is that there are good 
farmers as well as poor, intelligent and well educated as well 
as dull ones, and certainly there are poor lawyers, doctors, 
preachers and business men as well as good ones. There are 
also many fully "modern" farm-homes. But the reason 
for the present agitation for better agriculture is that while 
we can get along pretty well if many of the business and pro-
fessional men are dull and in efficient, farmers must all be 
intelligent and efficient or in the near future the rest of 
us cannot get along at all, for want of the necessities of life.

Another pressing need which makes extensive agricult-
ural education necessary is the matter of rural sanitation, and 
still another, the matter of good roads.

The writer is familiar with a rural habitation which 
is a pretty picture at a little distance, but the conditions
when seen on the spot are almost unendurable for a refined person, and would not be tolerated by the people themselves if they had been properly educated. The pig-pen and closet are horribly close to the well, which is a shallow one, and the house-slops are emptied still closer to it. The closet is the old-fashioned filthy kind, and has a large hole under the sill at one side, very convenient for the passage in and out of dogs, cats and pigs, not to mention flies. The dogs and cats play with the older children, while the flies repair to the near-by house at meal time, walking impartially over all kinds of food and drink, including the baby's milk-bottle. When sickness occurs, it is "inscrutable Providence!" Ye gods, what ignorance! Yet these people have "been through" the common schools, and are called educated. Who will deny that a different kind of education is needed? Give rural communities good high schools by consolidation of districts, and teach sanitation in connection with the course in agriculture, and present unhygienic conditions, of which there are others besides the above-mentioned, will vanish.

Education in road-building and maintenance is also necessary. In some sections of the United States farmers and their wives are absolutely confined to their homes for many weeks at a time suffering financial as well as social losses, on account of the miserable condition of the roads, which they think "can't be helped." Through proper education in the high schools not only the comforts and pleasures of good roads can be emphasized, but it can be demonstrated that good roads quickly pay for themselves in greater net returns for all produce that has to be hauled, a team handling not only a surprisingly
increased load, but being also enabled to haul stuff to market at the most advantageous times.

Agricultural education puts another matter in quite a different light, also. That is, the social standing of the farmer and his wife. "Time was" when a city-boy considered scarcely any term of approbrium more scathing than "hayseed" or "farmer." Time will be, is now—when many a grown-up-city-boy will envy the lot of his former acquaintances who have become farmers,—a synonym for happiness and prosperity following the new conditions of adequate agricultural education. Of course, the dirty, unkempt and careless farmer of the past did not deserve very much social consideration, but the well-educated farmer of the future will deserve and receive all the consideration that a successful artist, scientist or businessman is entitled to, for he will be all of these, and in many cases, a land-owner besides.

No one will now deny that agriculture should be taught in all the high schools of agricultural or even semi-agricultural communities, but how about those of large cities,—commercial, manufacturing and mining centers?

If the bulk of our population were quite stationary, like that of many of the old-world countries, and sons practised the occupations of their fathers, agricultural education would not be vitally necessary in city high schools, though it would still be desirable, as will be shown later. But in view of the fact that our population is very unstable and shifting, and that the American custom is decidedly toward sons adopting occupations different from those of their fathers, it is evident that city-boys should have agricultural education just as necessarily as the boys of rural communities. Many
of the latter will surely spend their years of maturity in cities behind desks and counters, and their places should be filled by city-bred men who find out, through agricultural education in the high school, that their likings and talents point toward the soil and crops and fat stock, rather than toward the shop, counter or desk.

Right here is the kernel of the whole thing.—Every young person should have as full an opportunity as possible, at the adolescent or high school age, to try his powers in each (or in as many as practicable) of the fundamental fields of human endeavor,—agriculture, commerce, mechanics, the learned professions—or at least in studies leading toward them.

How many wretched, incompetent grocery and dry-goods clerks would have become prosperous farmers if they had only had a taste of agriculture in the city high school? This having been denied them, they discover their real talent and proper vocation only (if at all) after reaching middle life, when it seems too late to change. Also many country boys who go to the cities to become misfits and failures could be held where they belong by agricultural education in the high school. They go to the city because they think that farming is nothing but drudgery. So it has been, perhaps, to their fathers. But even a little knowledge of the scientific principles involved changes dirt to Nature’s laboratory, air and water to wonder working chemical reagents, mismanagement to art, sordid drudgery to the boundless joy of creative activity.

Outside of the utilitarian aspect of the matter, however, I believe that just as the country boy should have an opportunity to take Latin and History as culture studies, so the city boy should have an equal opportunity to take agricult-
ure, for the very same reason, i.e., as a culture study, besides for other reasons. The same thing is true for sociological and political reasons, also. Both city-man and country-man should know something about each other's life and thought-material. The more this can be the case, the less sharp will be the line of demarcation between them, and the better will all men work together for the common good. Agricultural instruction is not by any means merely a vocational study for farmers alone; it is a happy combination of culture, disciplinary, and utility values suitable and desirable for all alike, no matter what their future occupation.

Agricultural instruction does not suffer by comparison with any other high school subject. As an example of the scientific status of high school agriculture, take the matter of capillary rise of water in the soil, as actually taught in the agricultural department of the Greeley, Colo., High School. Of course capillarity has already been taught for years in high school physics, but this teaching has been confined mainly to glass tubes set up with iron clamps on hard-wood tables, if it has escaped from the pages of the text-book at all. Some of the better or more human teachers have actually mentioned incidentally that the same thing occurred in soils and lamp-wicks; and that is all right, so far as physics is concerned. Physics is physics, and agriculture is agriculture. We do not want physics with an agricultural trend (that is, not as a substitute for agriculture,) nor do we want agriculture confined to mere statements of fact, but we want agriculture as a basic and separate subject, illuminated and explained by as many as possible of the applicable facts, principles and laws of physics, chemistry, geology, botany, zoology, physiology and
all the other sciences. But returning to our concrete example,—
After studying the physical composition of various soils brought
in from the farms by the boys, using the compound microscopes
after the general examination, comparison and rough analysis
had been made, we set up tubes of sandy, loam and clay soils
in shallow water and watched the latter rise up in the column
of soil. Considerable excitement was caused by the rapid rise
of water in the sand, as compared with the others, and a desire
to bet had to be promptly suppressed. Considerable liberty is
allowed in the laboratory, but not that much. Twenty-four
hours later the sand "backers" had to accept defeat, as they
found the water in the loam and clay away ahead. Now this cal-
led for scientific explanation. A keen feeling of need for
this had been aroused, distinctly according to Charters "Meth-
ods of Teaching" although as a matter of fact that much-studied
book had not been thought of at all. After an observation of
the rise of colored water in capillary tubes of different sizes,
the boys were ready and anxious for the lecture, as the text-
book did not explain the matter at all. Their note-books were
ready, but they forgot to take any notes on account of attend-
ing to the matter presented, and the impulse to remind them of
note taking was stifled, for fear of dividing and then losing
their splendid attention. So we went through the whole story,
with blackboard illustrations, until the bell rang. Teacher
and students had forgotten themselves, and knew nothing but ad-
hesion, cohesion, molecules, gravitation, surface-tension, and
capillarity. As the class was passing out, one of the boys
stopped a moment and said, "Say, I'm going to write that all
out at home tonight." The next day they all took notes on
the same thing, presented a little more didactically. They
already had a good general conception, but needed to get the
details and diagrams down on paper, for future reference. The third day they recited the whole matter, some with difficulty, some with ease, and by the end of the period all felt that they had mastered the problem of capillary rise of water in soils (of course, practical applications to soil conditions had been made).

I do not believe in college-work in high schools, and believe that in the sciences too much of it is often attempted. By college-work I mean exact work, which is really quite impossible, and only a farce when attempted, under ordinary high school conditions, including the adolescent nature. But nevertheless, I believe that some of these fundamental things should be made clear, by logical courses of reasoning based on scientific data. Vague ideas are of little use to anybody. Farmers need to know what they are doing, and why, in order that they may make the elements their servants instead of their masters. But there is great danger that too much technicality, too much book-work at the expense of out-door or laboratory work, may rob the whole subject of its very life. A nice balance in these matters is one of the most difficult problems of science teaching and calls for the best judgement of good men.

The following case well illustrates the difference between the popular conception of agricultural education and the real thing. A country boy came into the Greeley High School about the middle of November, and expected to join the class in agriculture and receive credit for the whole semester's work. When I expressed a doubt as to his ability to do this, including all the work to be made up, he laughed confidently and replied, "Oh, yes, I can, I was raised on a farm." "All right, said I, "how much starch is there in a potato?" "I think it is about seventy-five percent starch," said he. "No, you're
wrong on that. About how much protein is there in it?" "Sir?"
"How much protein?" "I don't know what that is." "Which is
the most nutritious part of the potato?" "I don't know."
"How does the starch get into the potato?" "It gets it from
the ground." "No,—what is starch, anyhow?" "I don't know."
Another country boy, who had taken the work from the beginning,
was standing near. "Bernard," said I, "What is Starch?"
"C H O," he answered, after a little thought. "What do
you mean by that?" Six atoms of carbon, ten atoms of hydrogen,
and five atoms of oxygen, in each molecule of starch." "What
are carbon, hydrogen and oxygen?" "They are chemical elements.
Carbon is a solid, hydrogen and oxygen are invisible gases."
"How do these elements form starch?" "The hydrogen and oxygen
are already combined to form water, and the potato-plants take
that up from the soil through the root-hairs. The carbon is
obtained from the carbon di-oxid which is in the air, and the
plants take it in through the stomata. Through the agency of
the chlorophyll and the energy of the sun's rays, the water
and the carbon di-oxid are combined in the leaf-cells to form
starch. There is some oxygen left over, which is thrown off
as a waste."

"Well, John, what do you think of that?" said I to
the new boy. "I guess I'd better wait till next year," said
he.

There is considerable difference of opinion among edu-
cators themselves as to the nature and aim of agricultural in-
struction in the high school. Some think that it should be
limited to broad, general principles without definite applica-
tion to local conditions, while others hold that the high school
graduate in the agricultural course should be thoroughly pre-
pared to earn his living as a farmer, at once and on the spot. The general tendency at present is to make the high school really practical and useful, Warren, of Cornell, puts it somewhat whimsically: "If we do not make farmers, we might at least stop unmaking them."

I do not advocate "putting in" agriculture just to be "up to date." This would result in text-book courses presided over by young ladies of unquestionable charm, but possibly a little short in scientific and agricultural training and ability. It would be a repetition of the "nature-study" farce which has already been enacted in our schools. In order to arrive at the desirable results set forth in the preceding pages, agriculture must be well taught by well-qualified teachers, preferably men, using suitable and efficient methods.

The scarcity of properly qualified teachers is a great difficulty in the way of high school agriculture at the present time, but this trouble will be overcome in the course of a few years as the need and opportunity become apparent. Men who teach agriculture should have all three of the following kinds of preparation:

1. Thorough training, including considerable university or agricultural college work, in the sciences of botany, zoology, physics, chemistry, physiology and geology; also in bacteriology and entomology if possible.

2. Actual practical experience in farming, gardening and fruit-growing.

3. Pedagogical training, and experience in teaching. In addition, the teacher of agriculture should have a talent for experimentation, a strong mechanical turn, some practical business ability, and considerable sociological insight and
understanding. It is not to be wondered at that capable teachers of agriculture are scarce, nor that they command higher salaries than those usually paid to high school teachers—twelve hundred to two thousand dollars per year.

The method of high-school agricultural instruction should be a skillful combination of text-books, lectures, reference books, government and state bulletins, farm journals, laboratory work, field-work, and perhaps above all, "project-work." One never fully knows a thing until he lives it or does it, hence instruction must be made as concrete and "living" as possible. The project-work in agriculture fulfills this ideal. In Massachusetts the project-work is emphasized above all other features, and rightly so. The actual care of a field-crop, garden, cows, horses, hogs, sheep, poultry or other live stock in connection with the study of scientific principles and the latest methods of applying them, together with accurate accounting of all expenses and income, comes about as near as possible to realizing in actual practise the ideal education. The practical difficulties in the way of this extra-program work are considerable, but are not insurmountable. In agricultural communities the agricultural work in the high school should take precedence over other studies and activities in program-arrangements.

The study of agriculture should continue through the summer months, and the project-work should not be considered successful unless made to pay a money-profit. As taught at present in most schools, with all the laboratory and field-work that can be given during the nine-months school-term, agriculture is decidedly incomplete. Real agriculture is impossible except during the out-door growing-season, and that
is just exactly the time when the class in agriculture is widely scattered and entirely separated from its teacher. This difficulty is quite easily overcome, but the remedy has not been very generally applied, because it breaks into the time-honored custom of letting teachers shift for themselves, salariless, during the summer months, and letting the children and youth cheerfully and rapidly forget a large part of what they were at so much pains to learn during the winter. The remedy referred to is the raising of back-yard gardens or the care of poultry by the city-boys, and crops, dairy or other work by the country boys, all under the supervision and advice of the teacher of agriculture, throughout the summer or, still better, the whole year, the instructor "making the rounds" as often as practicable. This method has been practised for years in Germany, with splendid results, and has been introduced into a few places in the United States. In some other places the teacher is hired for the whole year, and attends to the school-garden during vacation-time, and in the fall the young folks return and gather the stuff that "they have raised." This is a farce, so far as practical application of agriculture is concerned, except for the teacher himself. In still other localities the school-garden is planted only a little while before both teacher and pupils depart for all points of the compass, and the vegetables are either cared for occasionally by hired laborers or neglected altogether. This is worse than a farce, for to start anything, especially at some expense, and then abandon it, is worse than not starting it at all. Possibly the pupils learn how to plant the seed, but that does not compensate for the blighting influence of giving up a project just well begun, and abandoning the tender plants to the
mercies of the elements. The school-garden plan therefore does not seem very desirable in the northern states, while the home-garden under expert supervision, is entirely practicable, and desirable in every way. A little more foresight and expense for salary here, and the instruction given can be clinched and indefinitely retained by practical application under real life conditions during the growing season, instead of being largely forgotten and lost through disuse.

The agricultural instruction should also extend through the whole four years of high school, at least in distinctly agricultural communities. The valuable and practical subject-matter available for presentation is almost limitless, and there is no reason why it should not be given as much time in the curriculum as foreign language, history, or mathematics. I do not ask for any more time than these subjects have been given, for I do not believe that a decidedly narrow vocational education is best. Every man should have something to think about besides matters connected directly with his daily work. The well-educated farmer should have considerable knowledge of history, art, literature, etc., and should, in fact, be indistinguishable by either dress (outside of work time) or conversation from commercial and professional men. A proper education for his high and important calling would easily accomplish this, for it should not end with the high school course, even though this be such a great advance over past conditions, but should extend through a college course also if possible. The general contempt in which farming has been held in the past as something that "doesn't pay" is largely an outgrowth of the lack of general agricultural education. Having no other recourse, farmers have done their work according to the rules
of their grandfathers, or "by the moon" or the ground-hog, and it is no wonder that it has not always "paid." The wonder is that it has paid as well as it has in comparison with other lines of work which have had the advantage of special education or apprenticeship in preparation. It is rare, indeed, that the farmer has not made a living, often for a larger family than the city-man thinks he can support, and this in spite of the fact that the city-men, through their superior education in business methods, and organization, have seized "in transit" a large share of the profits which rightfully belonged to the farmer.

When all the possibilities of comfort, of beauty, and of financial prosperity connected with farming have been exhibited and demonstrated and made the rule instead of the exception then farming will have come into its own. There is just one way to bring all this to pass, and that is through education in agriculture, principally in the public high schools.


38. --------. Education for Country Life. Dep't of Agriculture, Office of Experiment Stations, Circular no. 84, Aug. 23, 1909, pp. 40.


54. ______. How the Adopting of a Course in Agriculture Would Help the Public Schools. N. E. A. 1913, pp. 808-812.


65. ---. Agriculture and Gardening in the Public Schools. N. E. A. 1913, pp. 812-813.


67. Puffer, J. A. Vocational Guidance. 1913. Chapter X.


71. Smith, W. H. All the Children of All the People. 1912. pp. 346.


78. True, A. C. and Crosby, D. J. The American System of Agricultural Education. Office of Experiment Stations, Circular 106, Feb. 15, 1911, pp. 28. (Revision of Circ. no. 83.)

The following are the best and most recent general bibliographies of Agricultural Education, covering a wider range than was included in the foregoing study.

